

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
4 August 2005 (04.08.2005)

PCT

(10) International Publication Number
WO 2005/071230 A3

(51) International Patent Classification:

F01C 9/00 (2006.01) *F02B 47/02* (2006.01)
F01B 21/00 (2006.01) *F01L 7/00* (2006.01)
F02B 41/04 (2006.01)

(74) Agents: SUNSTEIN, Bruce, D. et al.; Bromberg & Sustein LLP, 125 Summer Street, Suite 1100, Boston, MA 02110-1618 (US).

(21) International Application Number:

PCT/US2005/000932

(22) International Filing Date: 12 January 2005 (12.01.2005)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:

60/535,891 12 January 2004 (12.01.2004) US

(71) Applicant (for all designated States except US): LIQUID-PISTON, INC. [US/US]; 77 Kirkwood Road, West Hartford, CT 06117 (US).

(72) Inventors; and

(75) Inventors/Applicants (for US only): SHKOLNIK, Alexander, Cerge [US/US]; 106r Sciarappa Street, Cambridge, MA 02141 (US). SHKOLNIK, Nikolay [US/US]; 77 Kirkwood Road, West Hartford, CT 06117 (US).

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SM, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

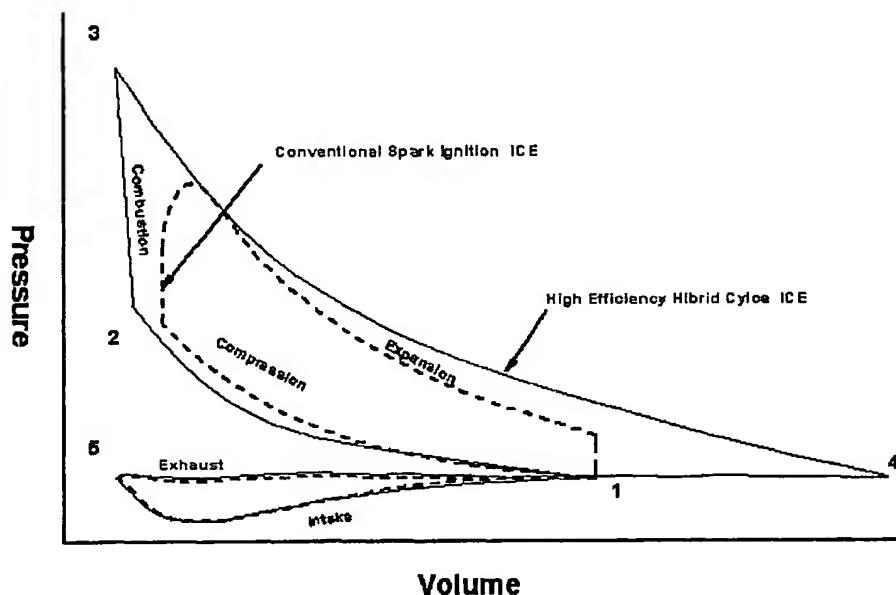
(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

— with international search report

[Continued on next page]

(54) Title: HAYBRID CYCLE COMBUSTION ENGINE AND METHODS



(57) Abstract: An improved internal combustion engine of the four-stroke variable volume type operates by refraining from introducing substantial fuel into the working medium during the compression stroke until substantially maximum pressure of the working medium has been reached and utilizing at least one of the following processes: (a) causing combustion of fuel under substantially constant volume conditions; and (b) causing the power stroke to provide a larger volume to combustion products than the compression stroke provides to the working medium. Related methods are also provided.

WO 2005/071230 A3



(88) Date of publication of the international search report:
26 May 2006

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.